



Applicant: Quigley, et al

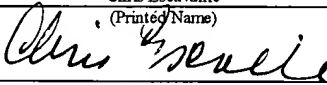
Title: DISCHARGE CHUTE FOR
CONCRETE

Appl. No.: 09/713,744

Filing Date: 11/15/2000

Examiner: Jeffery A. Shapiro

Art Unit: 3651

CERTIFICATE OF EXPRESS MAILING	
I hereby certify that this correspondence is being deposited with the United States Postal Service's "Express Mail Post Office To Addressee" service under 37 C.F.R. § 1.10 on the date indicated below and is addressed to: Commissioner for Patents, Washington, D.C. 20231.	
EL716377289 US (Express Mail Label Number)	3/27/03 (Date of Deposit)
Chris Escaville (Printed Name)	
 (Signature)	

ED
#203
Declaration
#10

**Declaration of Thomas Quigley, Scott Steckling and Troy Scott
under 37 C.F.R. §1.131**

We, Thomas Quigley, Scott Steckling and Troy Scott, declare:

1. We are adult residents of the State of Wisconsin.
2. We are all co-inventors of claims 1-23 of the above identified patent application.
3. Prior to October 15, 1999, we conceived the idea of the concrete transport vehicle, exterior concrete chute and method for reducing wear of an extension concrete chute, as described and claimed in the above identified patent application.
4. That prior to October 15, 1999, we commissioned drawings of several designs of lined chutes to be made at Oshkosh Truck Corporation that incorporated the concepts described and claimed in the above described application. (See Exhibit A).
5. That prior to October 15, 1999, we ordered plastic material for liner tests from Horn Plastics, Inc. through Color & Custom, Inc. (See Exhibit B).
6. That prior to October 15, 1999 we ordered aluminum castings for chutes from Northern Aluminum Foundry Co. (See Exhibit C).
7. That prior to October 15, 1999, we conducted tests on several chute designs including existing Oshkosh Truck Corp. steel chutes and the advanced aluminum chutes the latter of which is the subject of the above referenced U.S. Patent Application. Copies of an engineering technical report, a test description and a test log are attached hereto as Exhibits D to G.

RECEIVED
APR 09 2003
GROUP 3600

8. We were conducting tests before October 15, 1999 on several chute designs to determine the abrasion resistance qualities of each design. (See Exhibits G and H)

9. Based on the foregoing, we submit that the subject matter described in the above-referenced U.S. Patent Application and claims therein was conceived and reduced to actual practice before October 15, 1999.

10. Each of the dates deleted in Exhibits A-H are prior to October 15, 1999.

11. We declare under penalty of perjury under the laws of the United States of America, that the foregoing is true and correct. We make the statements set forth above, of our own personal knowledge and, if called upon to do so, could testify competently thereto. We acknowledge that willful false statements and the like are punishable by fine or imprisonment, or both (18 U.S.C. §1001) and may jeopardize the validity of the patent application and any corresponding patent.

Dated: 3-21-03

Thomas Quigley
Thomas Quigley

Dated: 3/26/03

Scott Steckling
Scott Steckling

Dated: 3/21/03

Troy Scott
Troy Scott

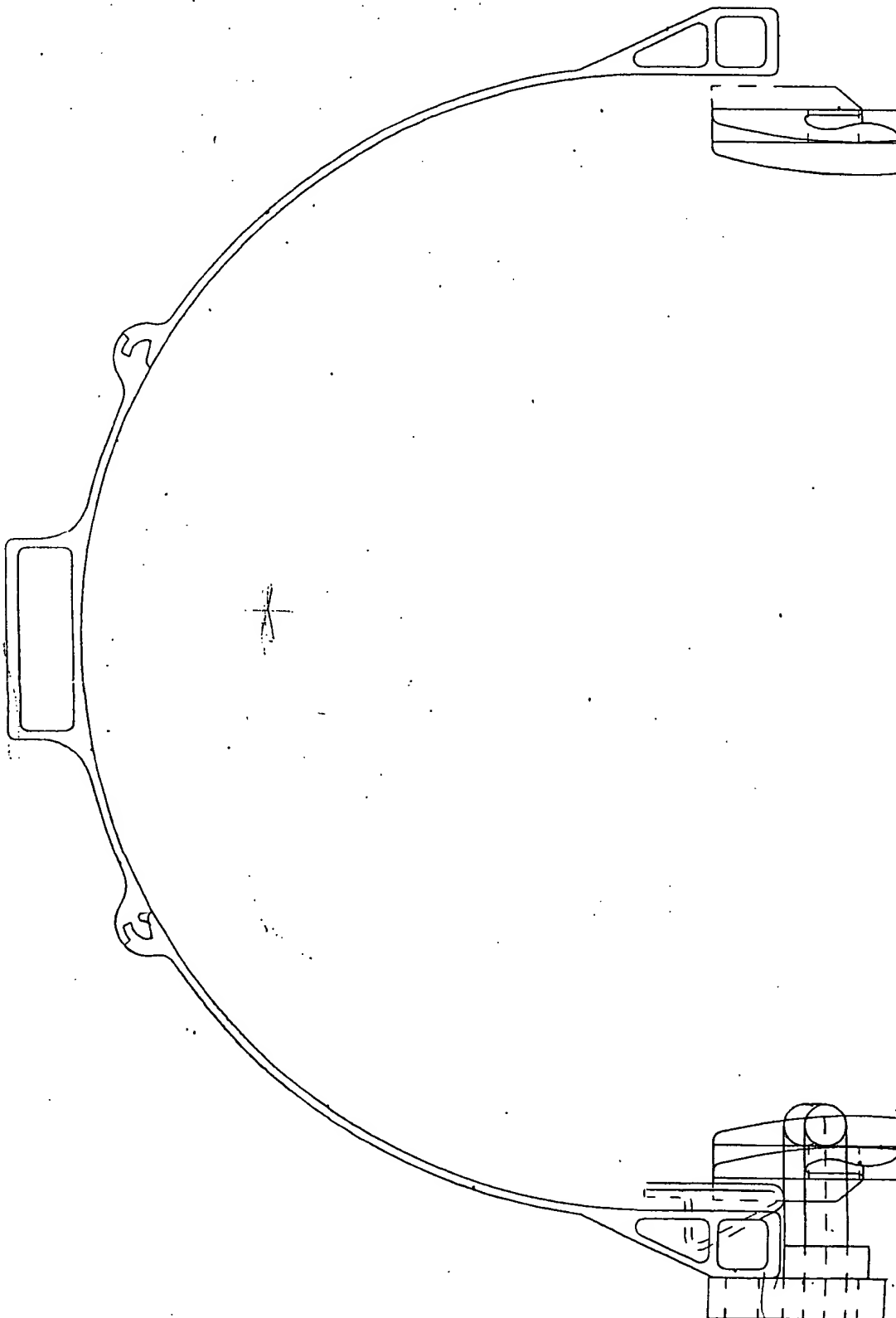
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LOGIN ID=019976

SUBGRP=slj
1999

SCALE= 2.5000 . DRAWID=clv chute

rev2

EXHIBIT A
PAGE 1



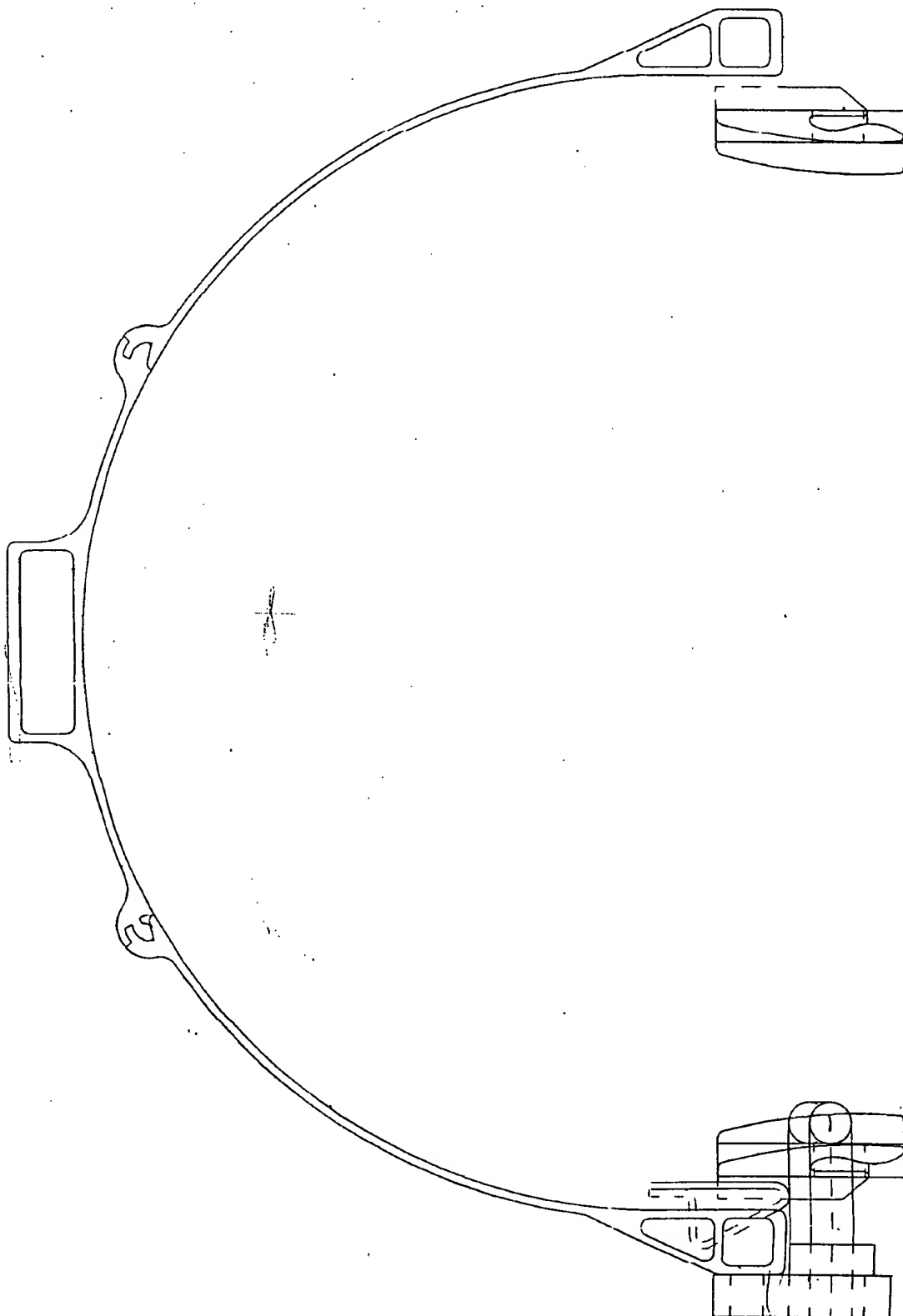
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SCALE= 2.5000

DRAWID=civ chute

rev2

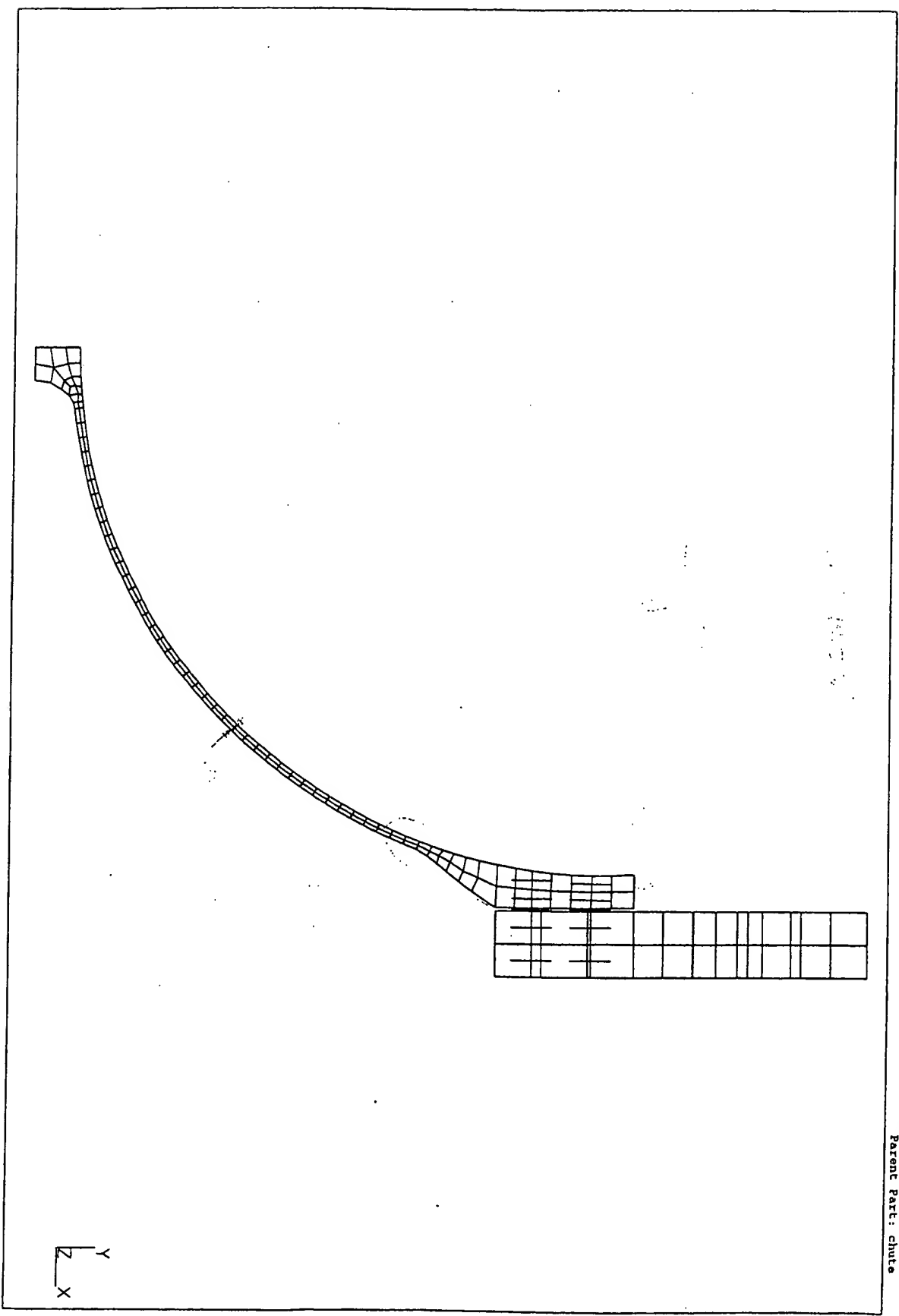
EXHIBIT A
PAGE 2



Database: /featur/ul6611/aschutext2a.mtl
View : No stored View
Task : Post Processing
Model: Fems1

I-DEAS Master Series 6 ml: Simulation

99 14:11:28
Units : IN
Display : No stored Option
Model/Part Bin: Main
Parent Part: chute

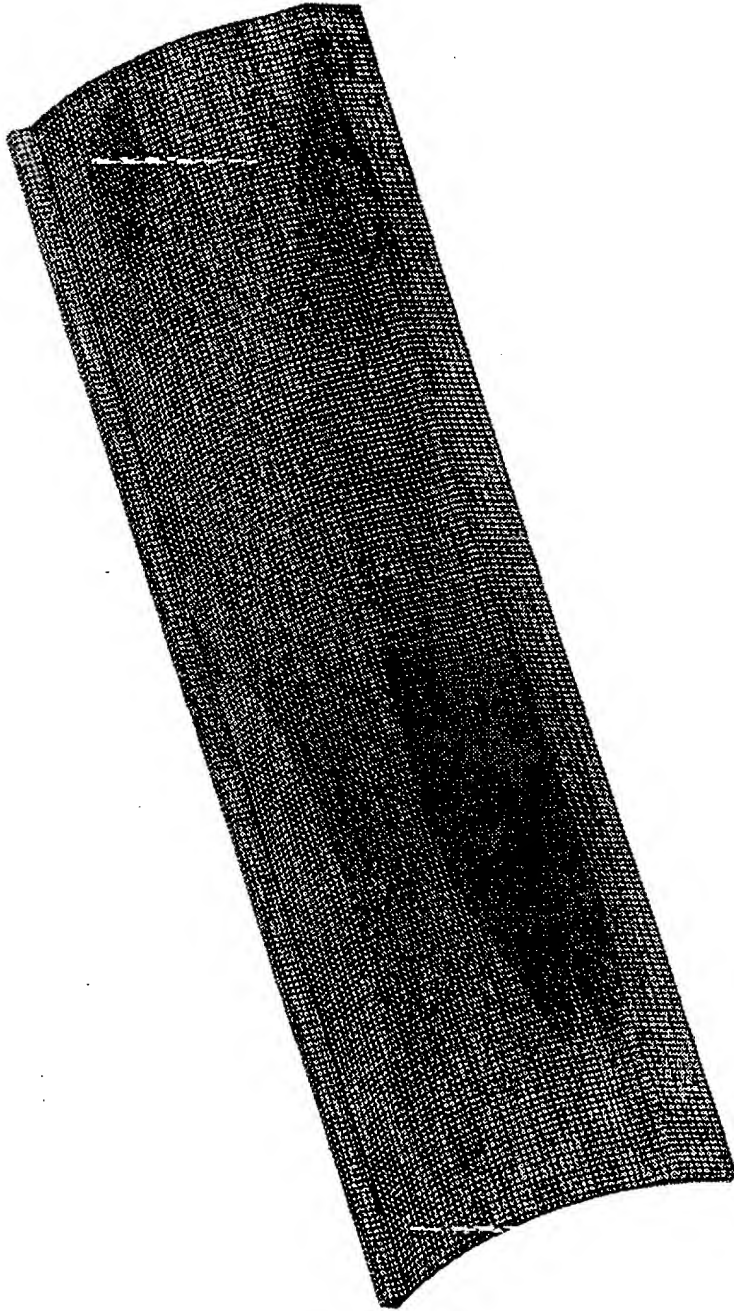


1-DEAG Monitor Series 6 ml: Simulation
 Results: /usr/ucb/plot/plot2a.mf
 View : 3D Front View
 Size : 768 x 1024
 Model: 10001

99 11/01/20
 Units : IN
 Display : NO SKEW OPTION
 Model/Part: 10001
 View: 3D Front View

RESULTS: 1- R.C. 1, STRESS, 3, LOAD STEP 1
 STRESS - VON MISES MIN: 1.71E+02 MAX: 4.24E+04
 STRAIN OF REF: YANT

VALUE OPTION: ACTUAL



1.24E+04
 3.61E+04
 1.10E+05
 2.91E+04
 2.50E+04
 2.10E+04
 1.70E+04
 1.26E+04
 8.61E+03
 4.30E+03
 1.71E+02



Colors & Customs, Inc.
554 W. Menasha Ave.
Whitefish, WI 54247

Mark Schamburack
Duc: (920) 732-3254
Res: (920) 732-3128
Fleet Body Repair
Blasting and Painting Services
Washic (Jining Systems

SUPERVAL

HORN PLASTICS, INC.

FORM NO 58102-
(701) 282-7447

BILL TO:
Colors & Customs Inc.
554 Menasha Ave.
Whitefish WI 54247

Telephone: (920) 732-3254 Ext. 0000

Telephone: (920) 732-3254 Ext. 0000

SHIP TO:

Oshkosh Truck Corp.
370 W. Mainway Ave.
Oshkosh WI 54903-2566
Attn: Thomas Quigley

SALES PERSON:

SEAN

HORN ORDER #:

031320

QST. #:	P.O. #:	SHIP VIA:	DATE ORDERED:	DATE TO SHIP:	TERMS:
29240	VERBOL WORK	Super-Die Direct	7/99	06/07/99	Cash

QTY. ORDERED	QTY. BACKORDER	QTY. SHIPPED	UNIT:	ITEM #:	LOC	DESCRIPTION:
3.00	0.00	3.00	FT.	11012096	WIS	1/8" X 96" Super-Slide Blue
3.00	0.00	3.00	FT.	11016096	WIS	3/16" X 96" Super-Slide Blue

Cut To 4 Pcs. 3' X 4'

Write (No Cost Samples) On package.

F.O.B. Wisconsin, Whitefish, WI - Super-Die/Direct

EXHIBIT B

00/05/1999 10:10:00 000000000000

HORN PLASTICS

EXHIBIT C



NORTHERN ALUMINUM FOUNDRY CO.

P.O. Box 1688 • Fond du Lac, WI 54936-1688
920-922-4110 • FAX 920-922-5319

QUOTATION
990802

August 21, 1999

Oshkosh Truck Corp.
P.O. Box 2566
Oshkosh, WI 54903-2566

Michael E. Michna

We are pleased to quote on the following aluminum castings:

For your part number: Female Chute

Estimated weight: 3.0#

Quantities: 10 - \$15.75
25 - 14.50
100 - 14.25 (These are estimates only.)
250 - 14.00
500 - 13.90

Comments: Quoting to Aluminum Association Standards.

Quoting alloy #356T6 @ \$.85/lb.

* Quote contingent on new design to eliminate core.

TERMS: 2% 10 NET 30

FOB: Our Plant

W.D.P.P.: \$ 2.00

*weight differential per pound

Pattern equipment to produce above:

Price: \$ 2000.00 (est.)

TERMS: 1/2 upon receipt of order
1/2 upon sample approval

Delivery: Pattern equipment: 4 weeks upon receipt of order.

Sample castings: 2 weeks upon receipt of pattern equipment.

Production castings: 4-6 weeks upon sample approval.

Hoping our prices will be favorable.

Yours truly,

Will R. Meyst, Vice President
Northern Aluminum Foundry Co.

"Quality Aluminum Castings Since 1945"



MTM 51.2 lbs
ADVANCE 29.2 lbs

ENGINEERING TECHNICAL REPORT

ETR NO: MTM 005

DATE OF INCIDENT: 8/3 & 8/4

MODEL: MTM, OSHKOSH, ADVANCE

VEHICLE S/N: N/A

VEHICLE MILES: N/A

VEHICLE OPERATING HOURS: N/A

PROJECT NO.: 4542

SUBJECT: Chute Strength Test REQUESTED BY: Tom Quigley

REASON: To confirm the strength and stability of the current production MTM chutes. Comparing the

OBJECTIVE: The main objective of the experiment was to determine that the MTM chutes are capable of withstanding the loading that is seen in the field. One set of four MTM chutes were dynamically tested and compared to a set of Advance aluminum chutes. During the test the chutes were incrementally loaded to a capacity of 1400 lbs. and shaken side to side and up and down. The steel MTM chutes were eventually bounced until failure. This failure prompted further testing to determine the true strength of the chutes.

A pull test was set up on the bedplate in which three chutes were mounted on the truck horizontally and pulled down until failure. Strain gauges were mounted on the bottom and on both the left and right rails of the chute nearest to the truck. A load cell was placed between the piston and the chutes in order to determine the force at failure. This "pull test" was completed with three different sets of MTM chutes, a set of old production Oshkosh chutes, and a set of aluminum Advance chutes.

An accelerometer was also mounted on the bottom side of the third chute in a separate acceleration test. This test was performed to find the acceleration experienced by the chutes during normal operation and also during extreme conditions. During the experiment four of the MTM chutes were fully loaded to 350 lbs. per chute for a total of 1400 lbs.

CONCLUSIONS: At this point, it has been determined that the average strength of the current MTM chutes is sufficient to handle the necessary amount of concrete in a static situation without catastrophic failure. However, this testing found that the chutes do fail in simple harmonic bouncing due to overloading forces caused by acceleration. In fact, figure 6 of this ETR shows that statically loading the chutes to an equivalent weight of the cement puts the material well into yield. In the comparison test between the MTM, Oshkosh, and Advance aluminum it was found that all chutes performed relatively close to each other. The MTM chutes were tested four times, failing from 1925.8 to 2113.6 lbs. The Oshkosh and Advance chutes were only tested once. Judging from the variance in the MTM chute, further testing of the Oshkosh and Advance chute is critical to accurately compare these three chutes.

TECHNICIAN: Dan Egan

REPORT BY: Andrew Roth

DATE: 8/9/99

TIME TAKEN: 1.5 Weeks

DISTRIBUTION: M. Maxfield, T. Quigley, S. Steckling, D. Egan, C. Verhoff

TEST PARTICULARS

Dynamic Chute Strength Test Results

Date: [REDACTED]

Table 1a: Advance Aluminum

Height Above Ground (in.)	Total Load (lb.)	Condition
86 3/4	0	Before Shaking
82 1/2	400	Before Shaking
80 1/2	400	After Shaking
79	600	Before Shaking
78 3/4	600	After Shaking
77 3/4	800	Before Shaking
76 3/4	1000	Before Shaking
76 3/4	1000	After Shaking
74 3/4	1200	Before Shaking
74	1200	After Shaking
72 1/2	1400	Before Shaking
71	1400	After Shaking

Table 1b: MTM Steel

Height Above Ground (in.)	Total Load (lb.)	Condition
82 3/4	0	Before Shaking
70 3/4	1400	Before Shaking
0	1400	After Shaking

*Note: Steel chutes failed during minimal shaking with 1400-lb load.



Figure 1: Four Advance aluminum chutes fully loaded to 350 lbs. per chute, a total of 1400 lb., deflects 15 1/4 inches.



Figure 2: Four steel MTM chute fully loaded to 350 lbs. per chute, a total of 1400 lb., deflects 12 inches.

Acceleration Test Results
8/2/99

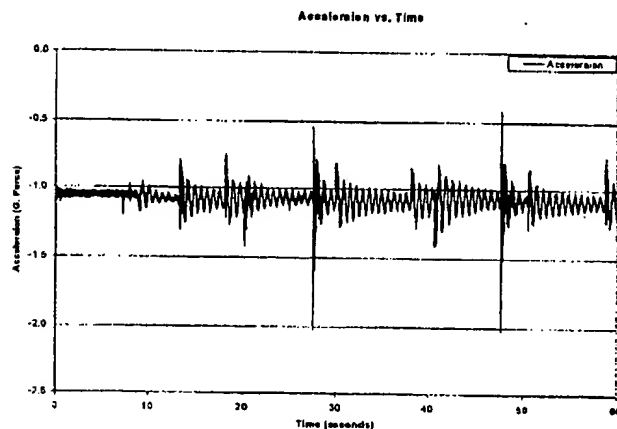


Figure 3: This graph represents the acceleration forces acting on the MTM chutes during normal operations. The chutes were raised to the maximum vertical position and then down to the lowest position. This sequence was repeated twice. (chute up, down, up, down, up, down) The chutes were raised at normal operating speeds without bouncing. The accelerometer was mounted at the bottom of the third chute and approximately in the middle of the set of four chutes.

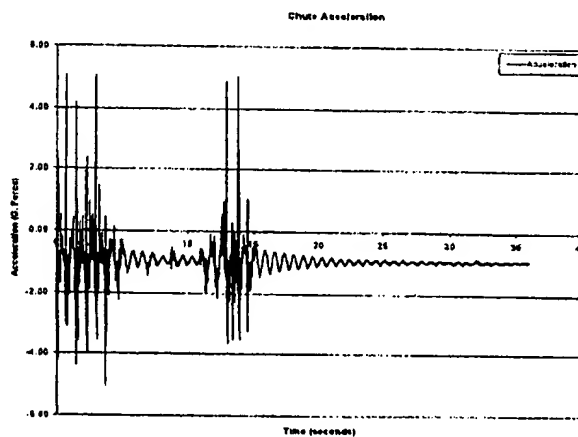


Figure 4: This graph is a representation of the acceleration forces acting on the MTM chutes during bouncing. In this case the chutes were bounced up and down once.

Exhibit D
Page 4

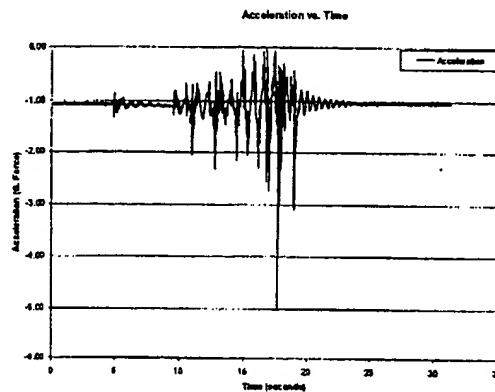


Figure 5: This graph represents the acceleration forces on the MTM chutes at the point of failure where the chutes buckled.

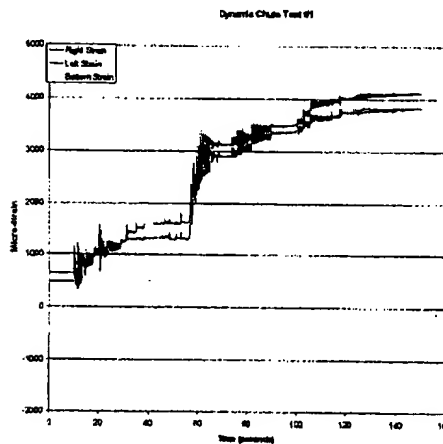


Figure 6: This graph illustrates the amount of strain in the side walls and bottom of the first chute during a Static Loading test.

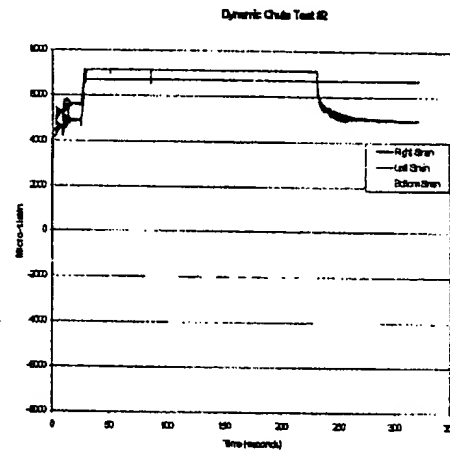


Figure 7: This graph is a continuation of figure 6. Here the chutes were dynamically tested until failure. The flat portion of the left and right strain is due to exceeding the limits of the testing equipment. Note that the material has entered the plastic range and does not start the test at zero.

Exhibit D
Page 5

Bed-Plate Pull Test

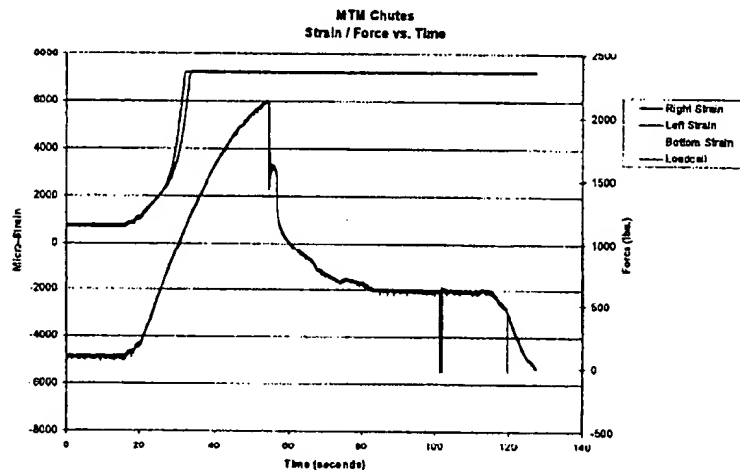


Figure 8: This graph shows both the recorded strain on the chute and the force being applied by the piston until failure. This MTM chute failed by buckling.

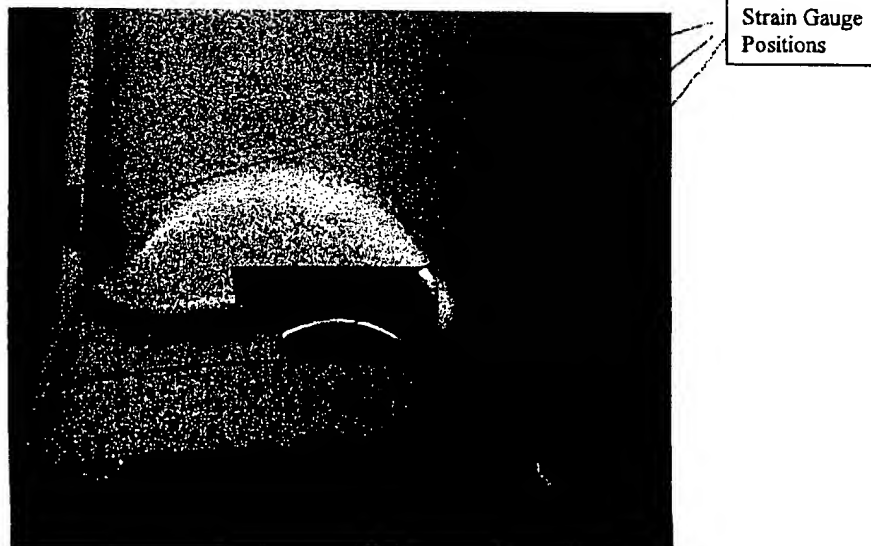


Figure 9: Failed MTM chute, Bed-Plate Pull Test #1

Exhibit D
Page 6

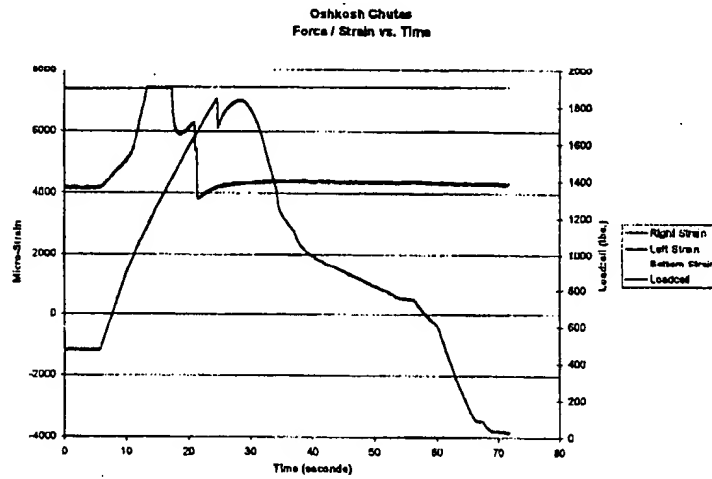


Figure 10: This graph shows both the recorded strain on the chute and the force being applied by the piston until failure. This Oshkosh chute failed by buckling.



Figure 11: Failed Oshkosh chute, Bed-Plate Pull Test

Exhibit D
Page 7

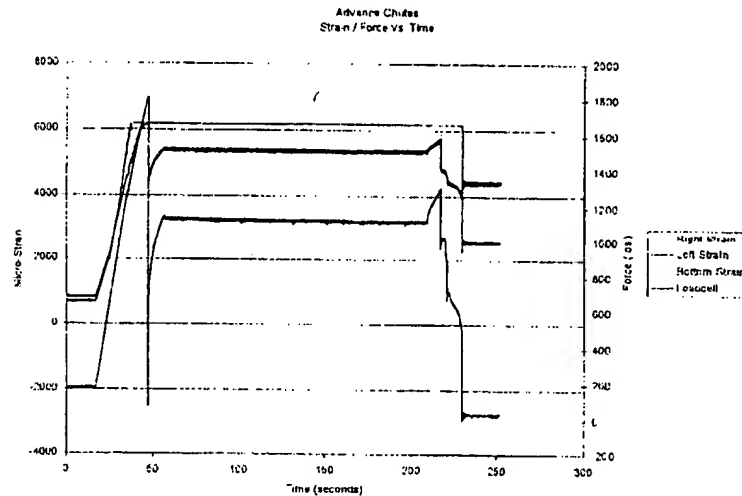


Figure 10: This graph shows both the recorded strain on the chute and the force being applied by the piston until failure. This Advance aluminum chute's failure was due to the bottom welds cracking and eventually shearing the metal. The flat region is due to a stop in the test when the chute was analyzed. This chute failed at the end farthest away from the truck.



Figure 13: Failed Advance aluminum chute, Bed-Plate Pull Test

Exhibit D
Page 8

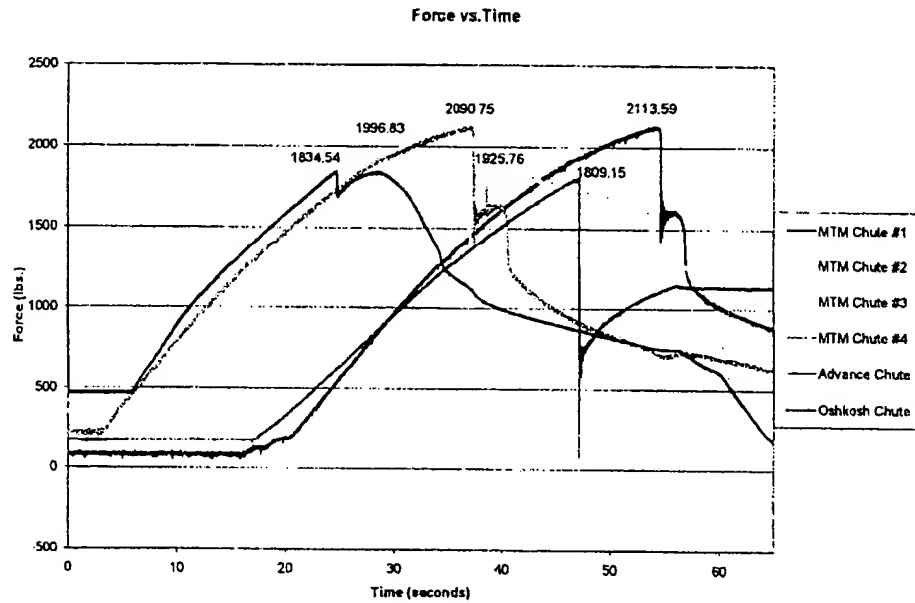


Figure 14: This graph compares the failure point strength of each chute tested including the Oshkosh and the Advance aluminum.

Cement Chute Abrasion Test Stand

Chute Weights Before Test (214 cycles)

Chute/coating thickness was not determined before testing.

Aluminum	39.2 lbs.
Anodized	43.2
Painted	74.6
Rubber	80.0
Plastic	80.2

Relative Chute Angles

Position: Rubber chute up

Rubber	38.2° (after grinding to adjust position)
Painted	37.1°
Aluminum	37.9°
Anodized	38.3°
Plastic	38.3°

Position: Rubber chute down

Rubber	33.6° (after grinding)
Painted	34.9°
Aluminum	34.0°
Anodized	33.6°
Plastic	33.6°

Daily Log

Notes should be taken daily as the test stand is operating to note changes in the setup and chutes.

Refer to MS Excel spreadsheet S:\Dept\T&d\AKotila\Chutes\dailylog.xls (8/25/99) for additional copies of the daily log sheet.

Simulated Mix Formula

The basic simulated concrete mix calls for 2100 lbs. sand, 1800 lbs. gravel, and 250 lbs. water. After converting this to a volume percentage and making a three-gallon batch for each chute, it was found that the mix would barely slide in some of the chutes, and the water content was difficult to control due to evaporation. To simplify the process, improve sliding, and perhaps increase abrasion, a formula consisting of 21 lbs. clean sand, 18 lbs. washed gravel, and 0 lbs. water was finally used for the test. Some moisture was present in the sand, but only that which is found in typical "sandpit sand." Since the same material is used cycle after cycle, the mix tends to wear out. After 2000 cycles, it can be observed that the sharp edges of the gravel is rounding off and rocks are breaking down into small pieces. To keep the wear-rate generally constant, the simulated mix will need to be replaced with fresh material periodically as needed.

Yards per Cycle Correlation

To correlate the number of test stand cycles with the number of yards of mix passing through the chutes, a number of assumptions were made. One cycle consists of one full extension and retraction of the hydraulic ram; therefore the aggregate passes through the middle of the chute twice per cycle. Density: Dry sand is about 100 lbs/ft³, ¾" stone is 96 lbs/ft³. Therefore each chute contains 0.015 yd³. This volume passes through the chute twice per cycle, yielding 0.03 yd³ per cycle. Assuming the present (8/24/99) test stand speed of 232 cycles per hour remains constant 24 hours per day, each chute will see 167 yd³ per day.

Real-World Application

Extension of the abrasion-test-stand findings to real-world cement truck operation can be roughly approximated. Assumptions must be made to approximate the amount of concrete that passes through a commercial chute per unit time. Estimates may then be drawn regarding chute-coating performance over a typical chute lifecycle. **Clear this up!** Truck holds about 10 yards, makes perhaps 5 trips per day. How long do chutes last? 10400 yds/yr? Might take 62 days of running the test stand 24 hr/day to simulate one year of commercial use. One must be very careful extrapolating data in this way however, since we are not using real concrete down a full multi-length chute. The test should be used more as a *comparison* between different types of chute coatings.

Description of Photographs

Photographs associated with this project are located in the same directory as this document: S:\Dept\T&d\Akotila\Chutes. Files named aluminum1-3, anodized1-3, plastic1-3, steel1-3, and rubber1-3 are photos taken before testing began, to be used as a reference, or "before," for comparison with "after" photos. Files running1-2 and teeter1-3 are shots of the test stand in operation at the beginning of the test.

Continuation Plans

Continue to fill out a daily log to qualitatively document testing conditions and chute performance. Once the test has been determined to be complete (coating fails or wears through), weigh the chutes again to determine if there has been any measurable loss of mass due to wearing. The digital floor scale from NPD was used for the beginning values. It may be useful to measure coating thickness in worn and unworn areas of the chute for comparison.

Personnel Contacts

NPD: Scott Steckling
T&D: Jack Woelfel, Dan Egan

EXHIBIT F

CHUTE CYCLE TESTING

 $0.034 \text{ yd}^3 / \text{CHUTE} / \text{CYCLE}$

 SEPTEMBER TESTING
 9/23/99

157,253 CYCLES

94 DAYS OF TESTING

 $\Rightarrow 4717.59 \text{ yd}^3$ MOVED

- HMW MATERIAL WAS BUBBLING AND HAD HOLES.

 JANUARY TESTING
 1/24/00

111,000 CYCLES

 $\Rightarrow 3330.0 \text{ yd}^3$ MOVED

- HMW STARTING TO GET WAVER
- UHMW + POLYURETHANE COATINGS SHOW NO VISUAL SIGNS OF ABRASION. (SEE PHOTOS)

1/31/00

171,414 CYCLES

- HMW WORN THROUGH
- UHMW + POLYURETHANE COATINGS SHOW SLIGHT VISUAL WEAR. (SEE PHOTOS)

2/9/00

250,000 CYCLES

- POLYURETHANE COATING IS WORN THROUGH.
- UHMW SHOWS SLIGHT WEAR. (SEE PHOTOS)

2/16/00

308,400 CYCLES

- UHMW SHOWS SLIGHT WEAR (SEE PHOTOS)

2/23/00

372,550 CYCLES

- UHMW SHOWS SLIGHT WEAR

3/01/00

420,450 CYCLES

- UHMW SHOWS SLIGHT WEAR.

3/07/00

480,500 CYCLES

- UHMW SHOWS SLIGHT WEAR

5/15/00

638,053 CYCLES

- UHMW WORN THRU (SEE PHOTOS)

638,053 CYCLES	0.034 yd^3	= 19,411 yd^3
	CYCLE.	

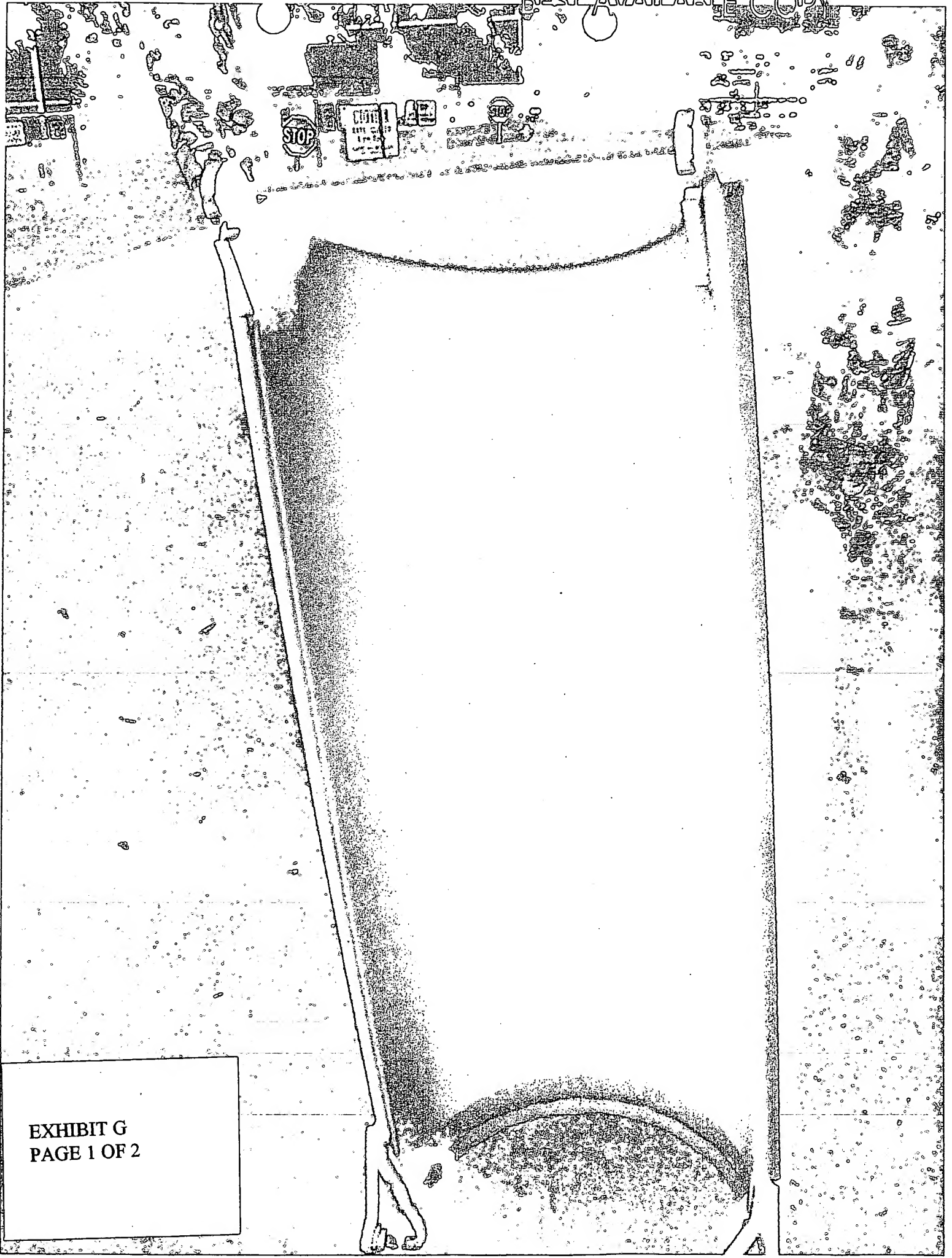


EXHIBIT G
PAGE 1 OF 2

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EXHIBIT H

